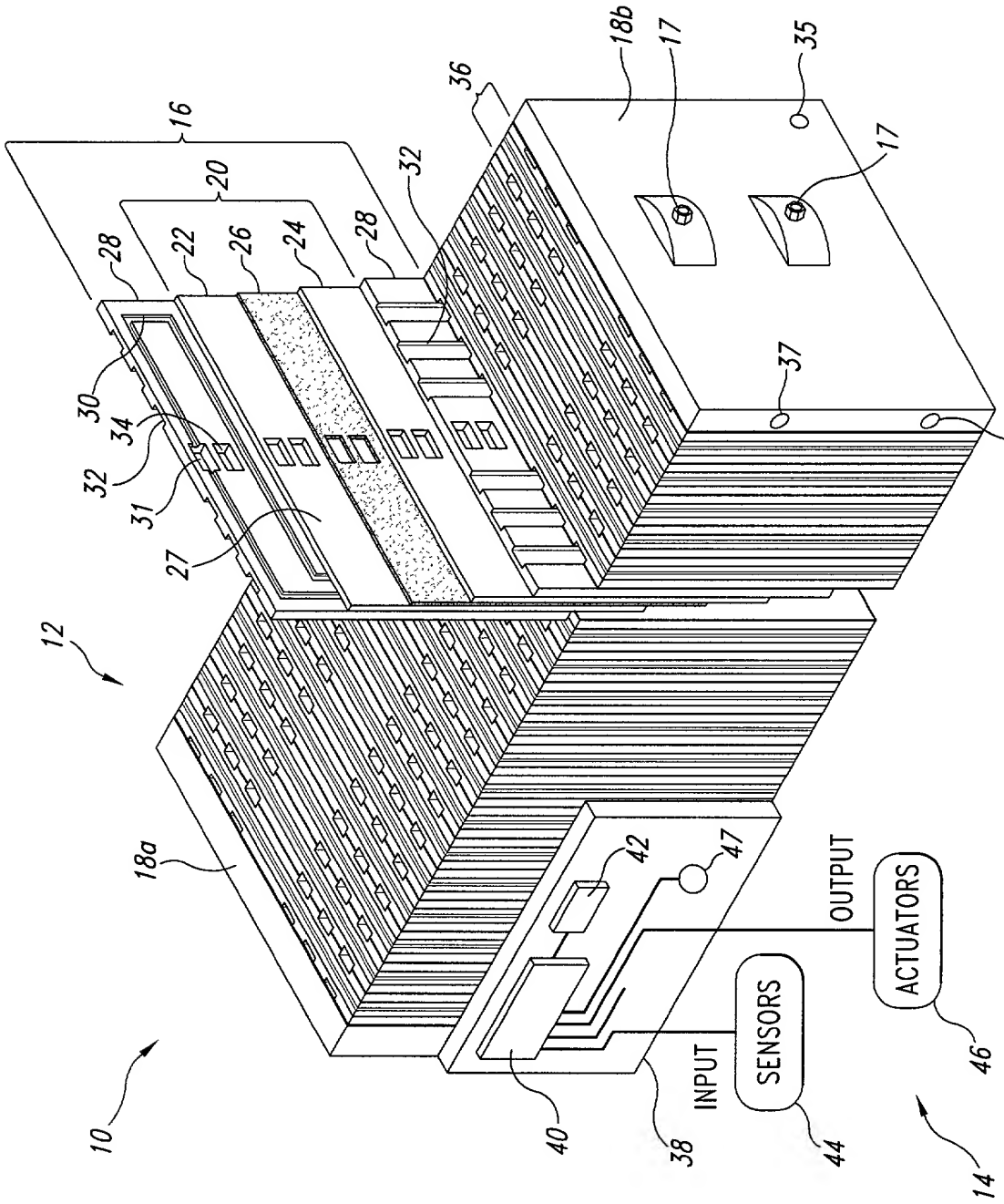
16
20
28
22
26
24
28
32
36
18b
17
35
17
37
39
30
34
32
31
27
12
18a
42
47
OUTPUT
ACTUATORS
46
INPUT
SENSORS
44
40
38
10
14

Fig. 1

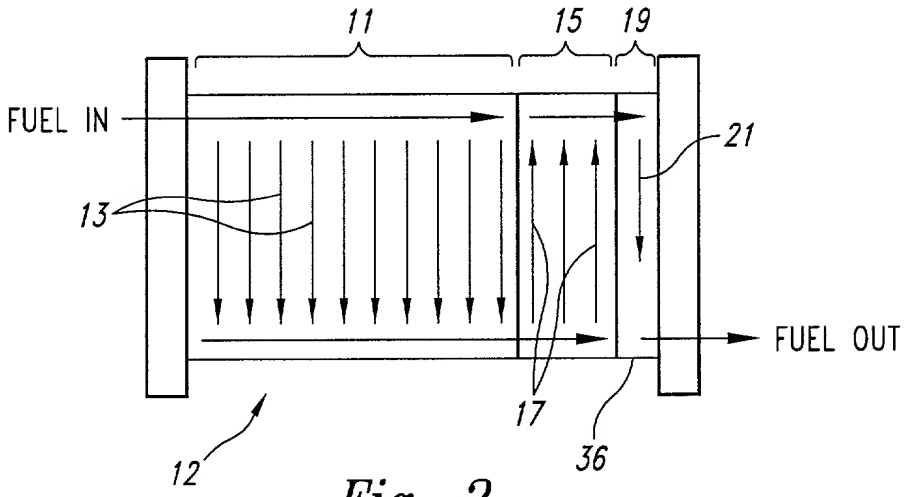
11
15
19
FUEL IN
21
13
FUEL OUT
17
36
12

*Fig. 2*

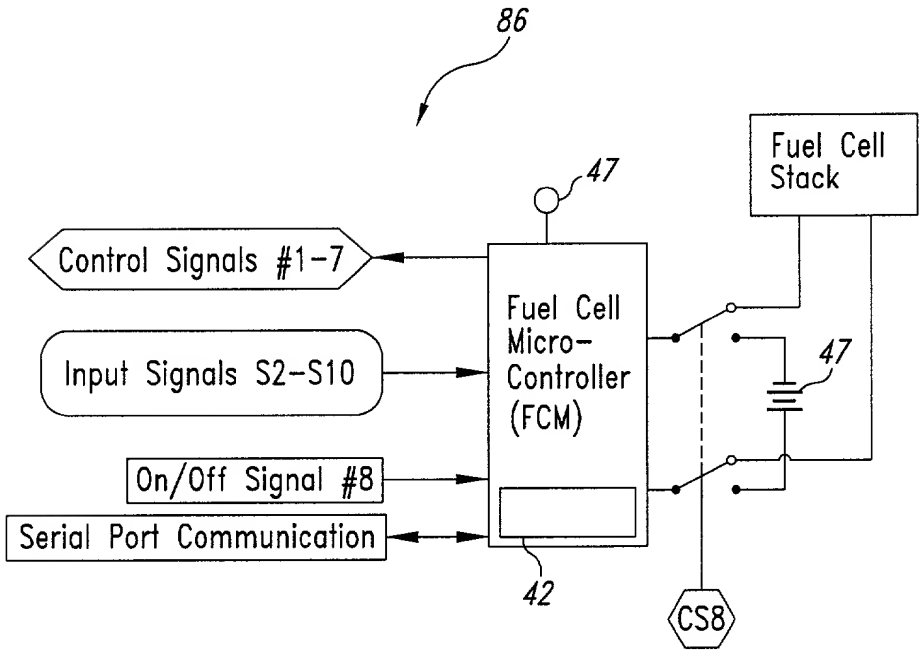
86
47
Fuel Cell Stack
Control Signals #1-7
Fuel Cell Micro-Controller (FCM)
Input Signals S2-S10
47
On/Off Signal #8
Serial Port Communication
42
CS8

*Fig. 4*

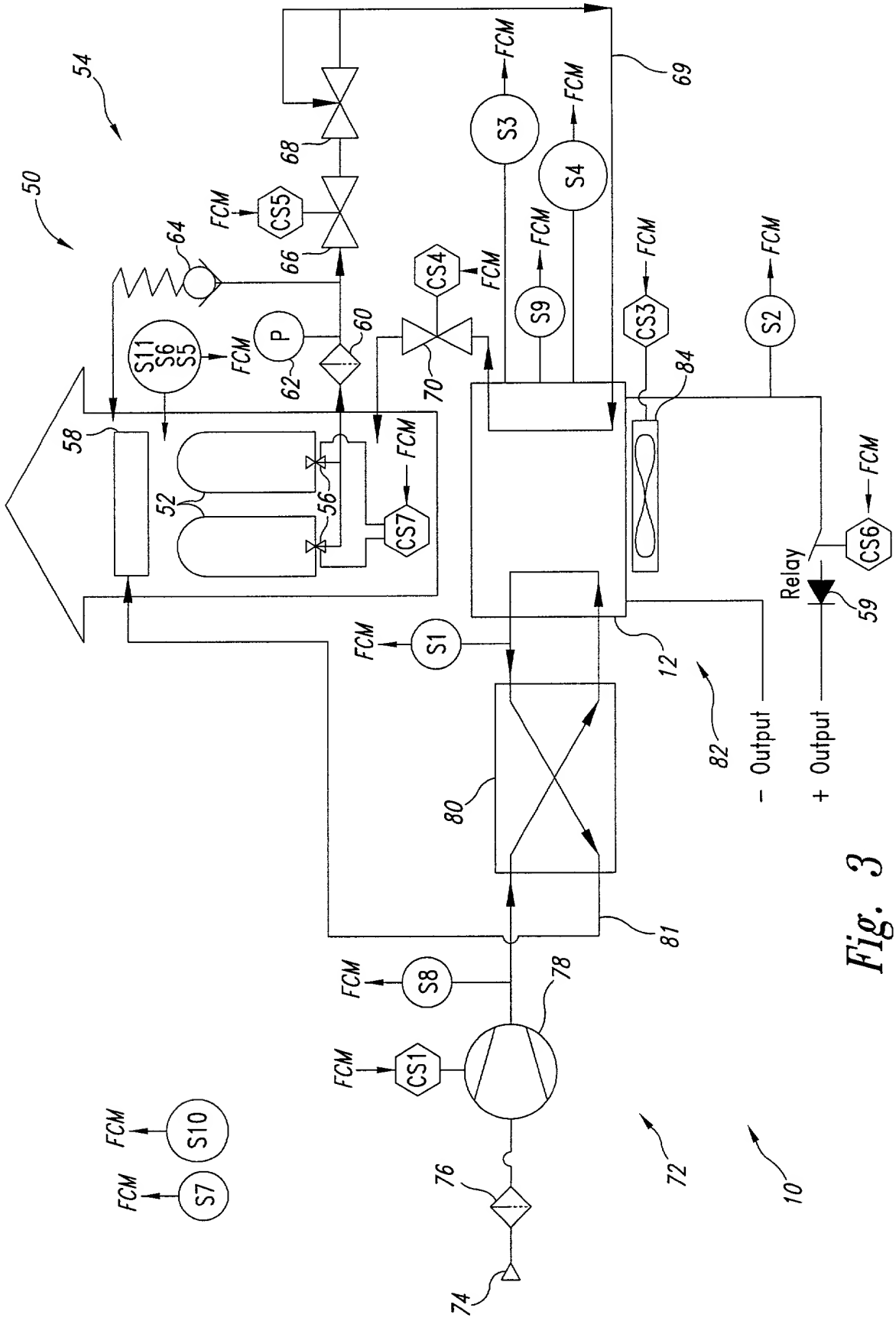
54
50
68
69
FCM
CS5
S3
S4
64
66
CS4
S9
CS3
S2
S11
S6
S5
P
60
62
70
84
58
52
56
CS7
CS6
Relay
59
S1
12
82
- Output
+ Output
80
81
S8
78
CS1
S10
S7
76
74
72
10

Fig. 3

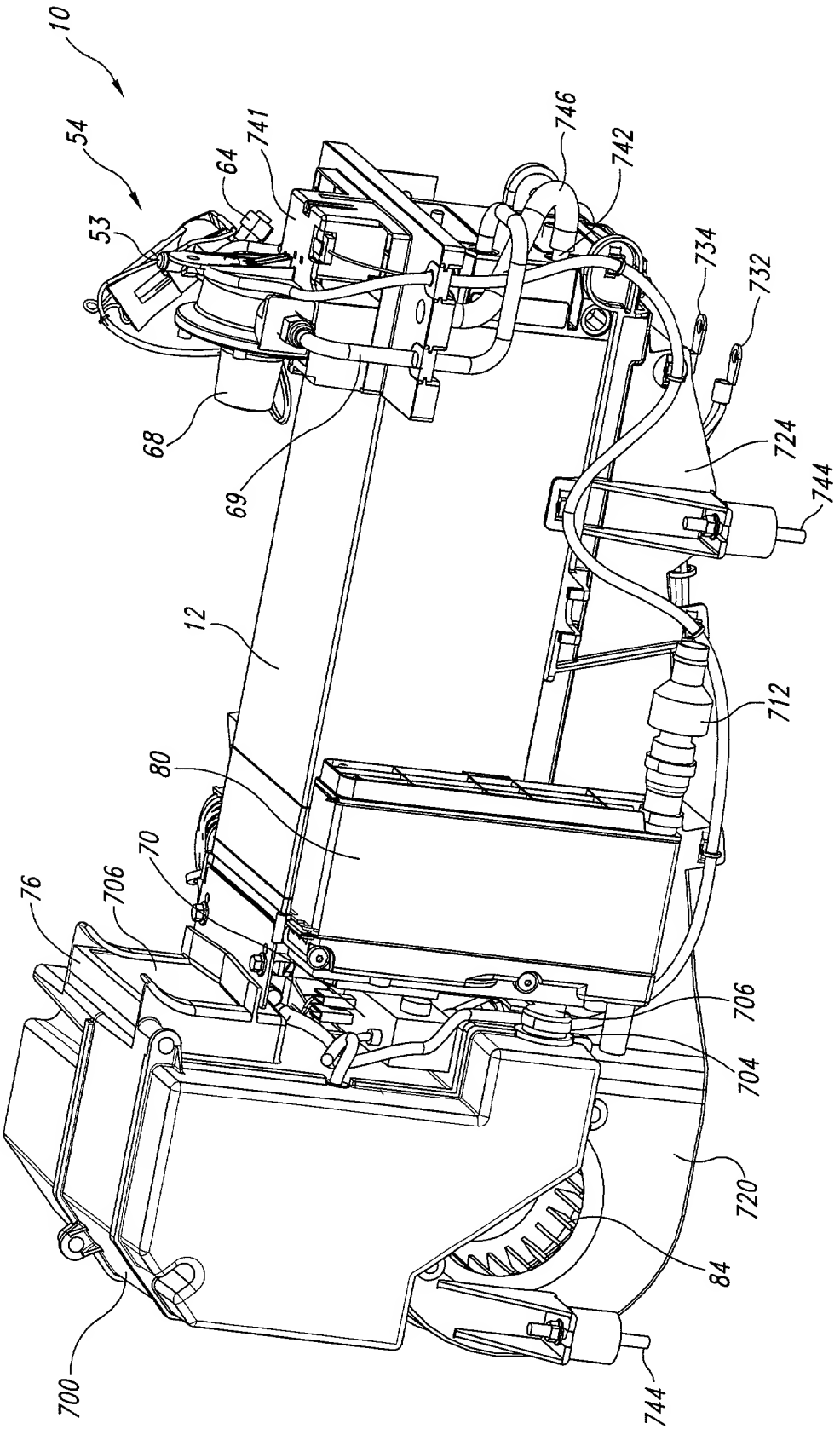
10
54
53
64
741
746
742
734
732
68
69
724
744
12
712
80
70
706
76
706
704
720
84
700
744

Fig. 5

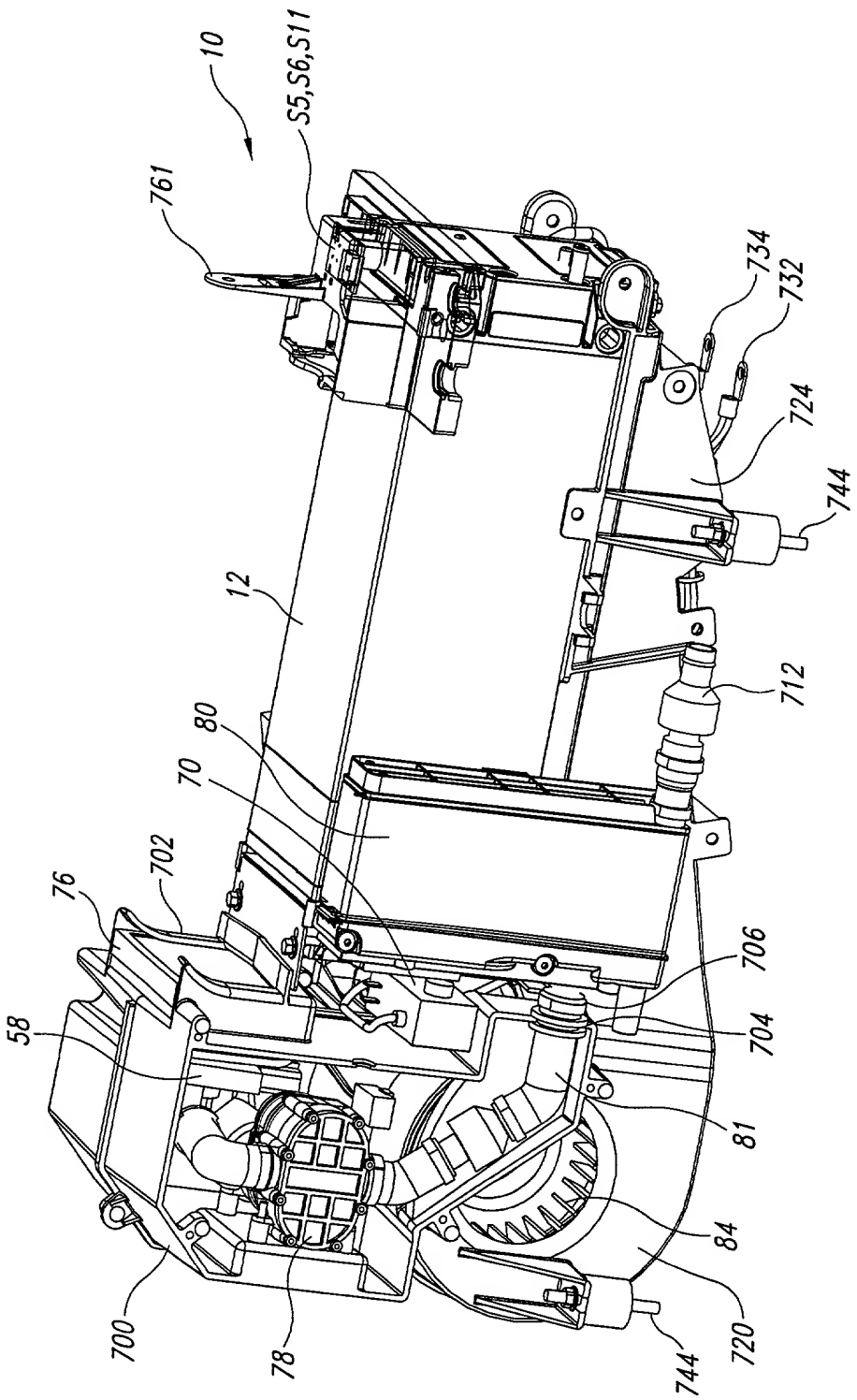
10
S5,S6,S11
761
734
732
724
744
12
712
80
70
702
76
706
704
58
81
84
700
78
744
720

Fig. 6

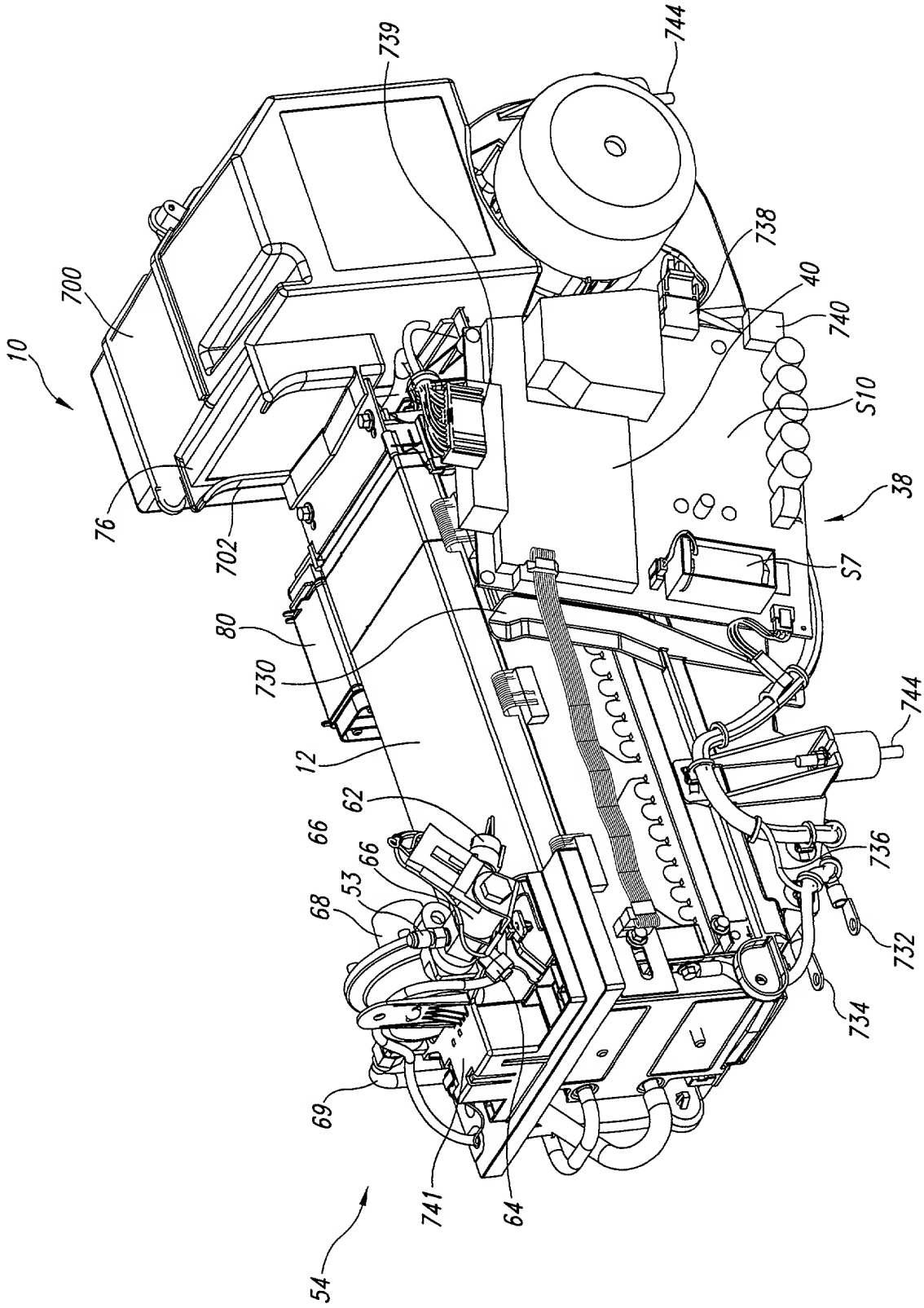
10
700
739
744
738
40
740
S10
38
S7
76
702
80
730
12
62
66
66
53
68
69
741
64
54
744
736
732
734

Fig. 7

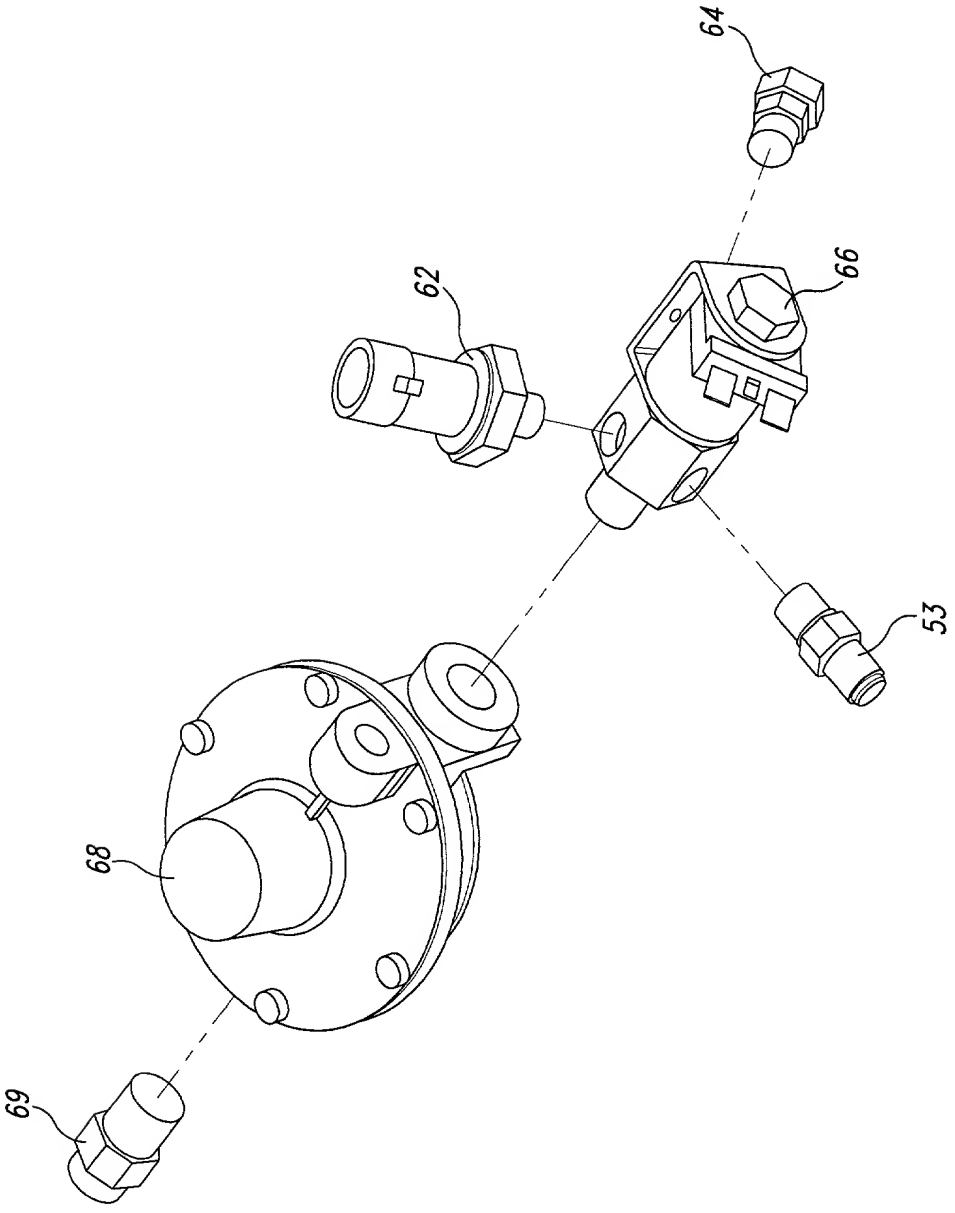


Fig. 8

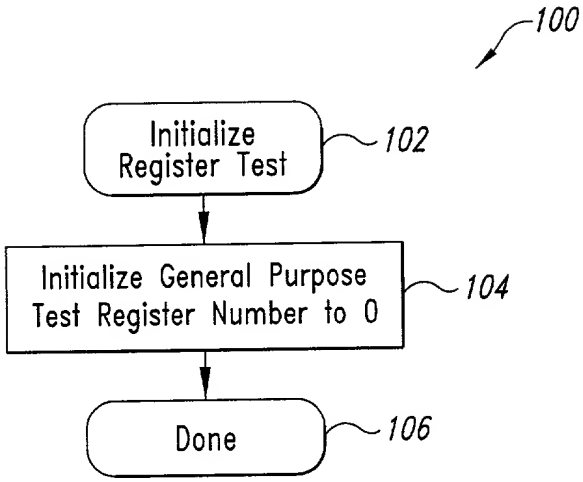
100
Initialize Register Test
102
Initialize General Purpose Test Register Number to 0
104
Done
106

*Fig. 9*

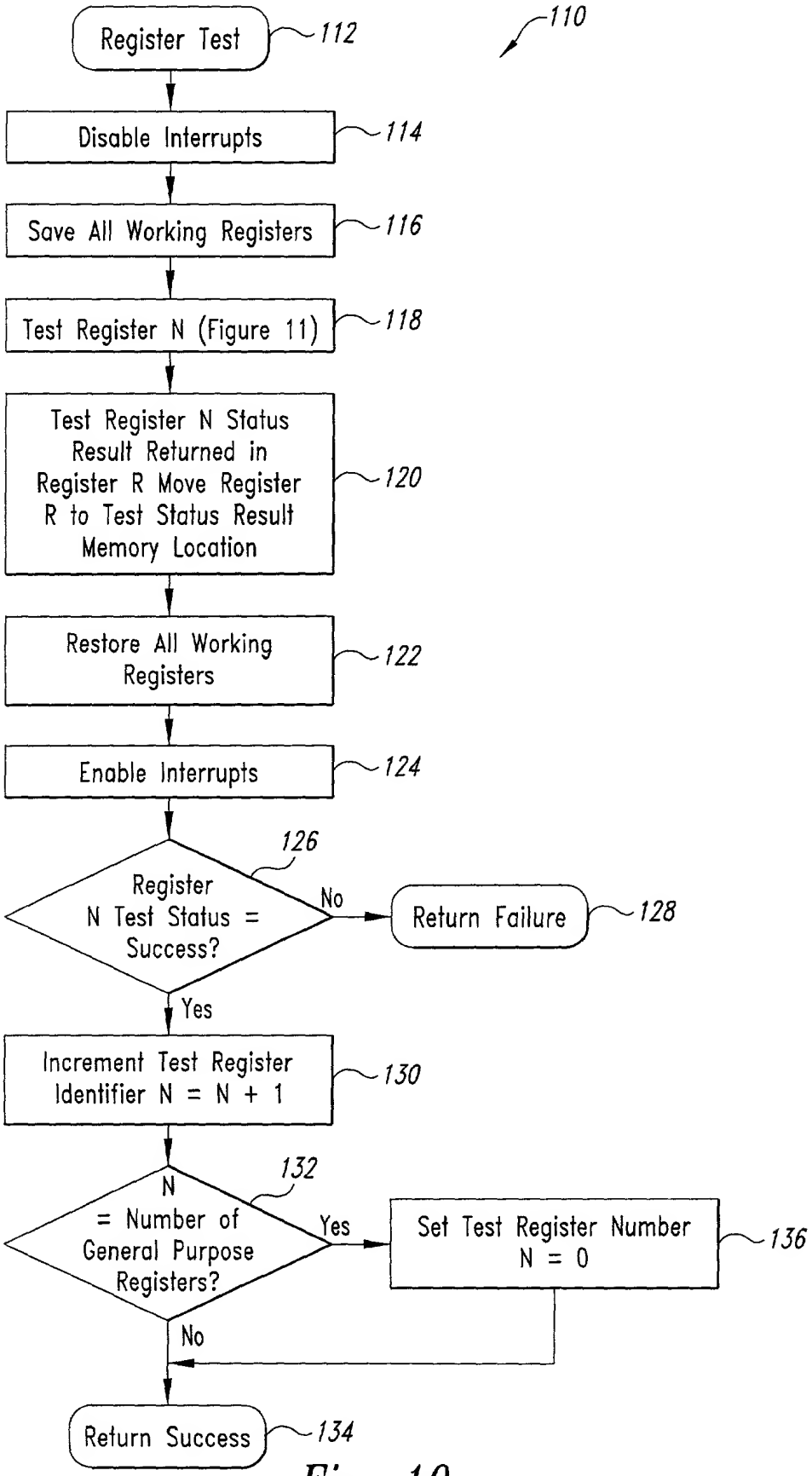
110
Register Test
112
Disable Interrupts
114
Save All Working Registers
116
Test Register N (Figure 11)
118
Test Register N Status Result Returned in Register R Move Register R to Test Status Result Memory Location
120
Restore All Working Registers
122
Enable Interrupts
124
126
Register N Test Status = Success?
No
Return Failure
128
Yes
Increment Test Register Identifier N = N + 1
130
132
N = Number of General Purpose Registers?
Yes
Set Test Register Number N = 0
136
No
Return Success
134

Fig. 10

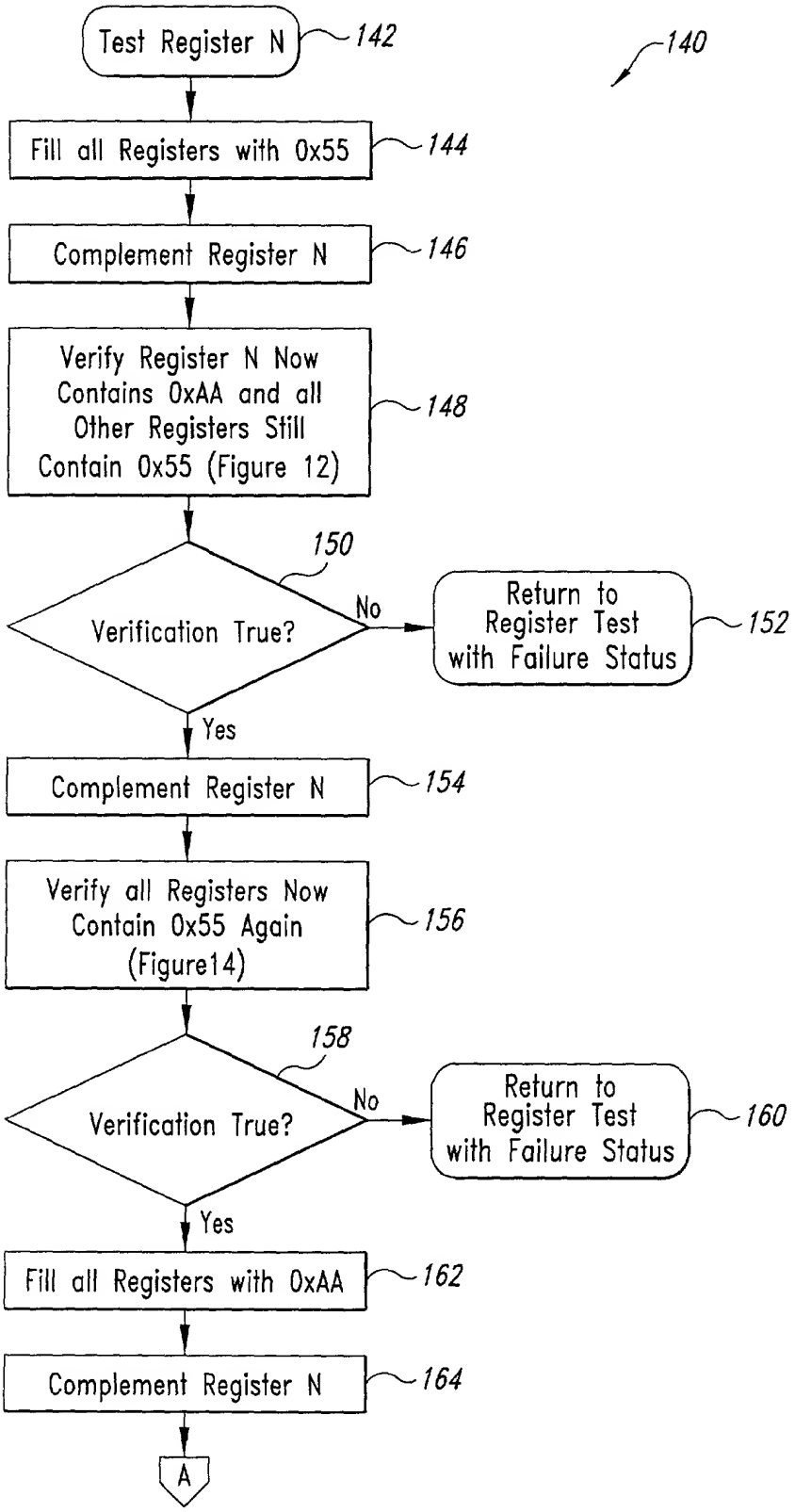
Test Register N
142
140
Fill all Registers with 0x55
144
Complement Register N
146
Verify Register N Now Contains 0xAA and all Other Registers Still Contain 0x55 (Figure 12)
148
150
Verification True?
No
Return to Register Test with Failure Status
152
Yes
Complement Register N
154
Verify all Registers Now Contain 0x55 Again (Figure14)
156
158
Verification True?
No
Return to Register Test with Failure Status
160
Yes
Fill all Registers with 0xAA
162
Complement Register N
164
A

*Fig. 11A*

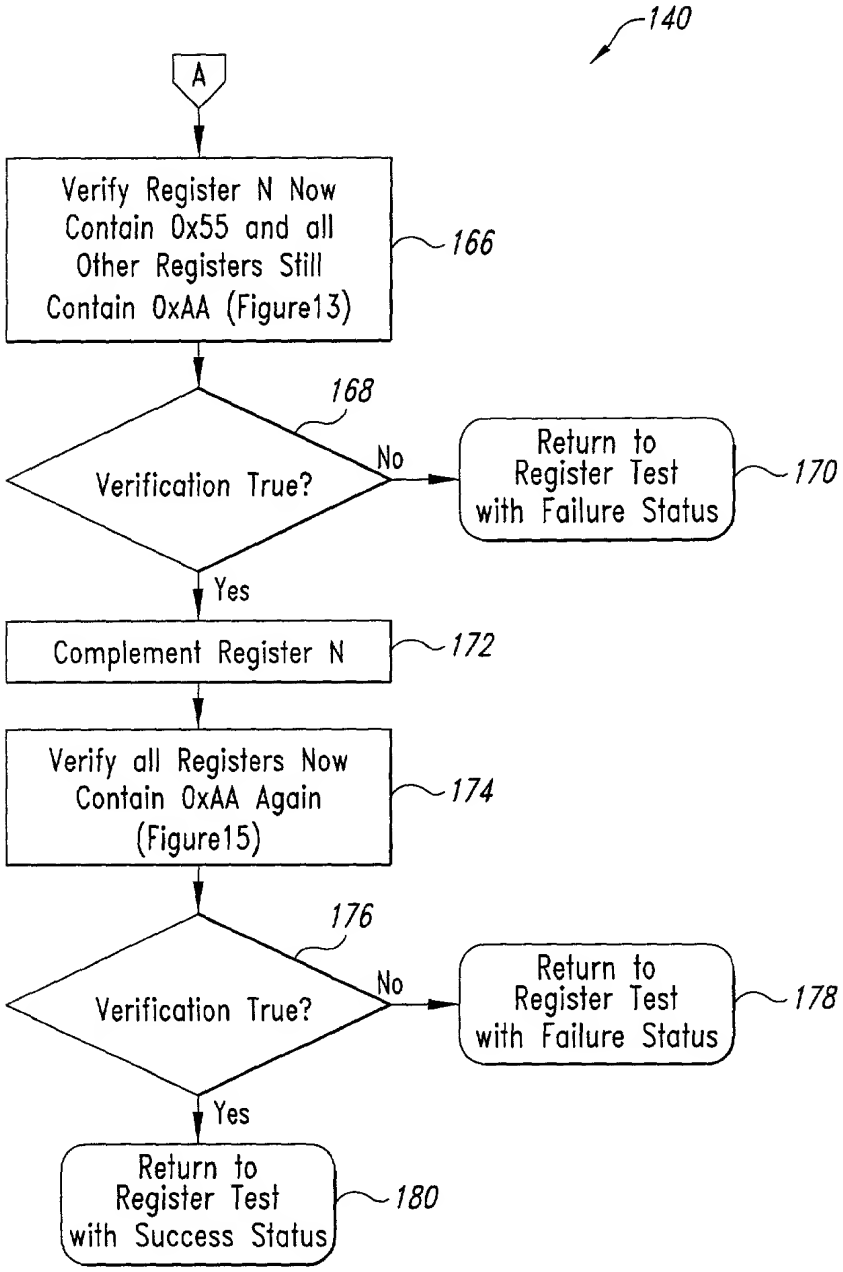
140
A
Verify Register N Now Contain 0x55 and all Other Registers Still Contain 0xAA (Figure13)
166
168
Verification True?
No
Return to Register Test with Failure Status
170
Yes
Complement Register N
172
Verify all Registers Now Contain 0xAA Again (Figure15)
174
176
Verification True?
No
Return to Register Test with Failure Status
178
Yes
Return to Register Test with Success Status
180

*Fig. 11B*

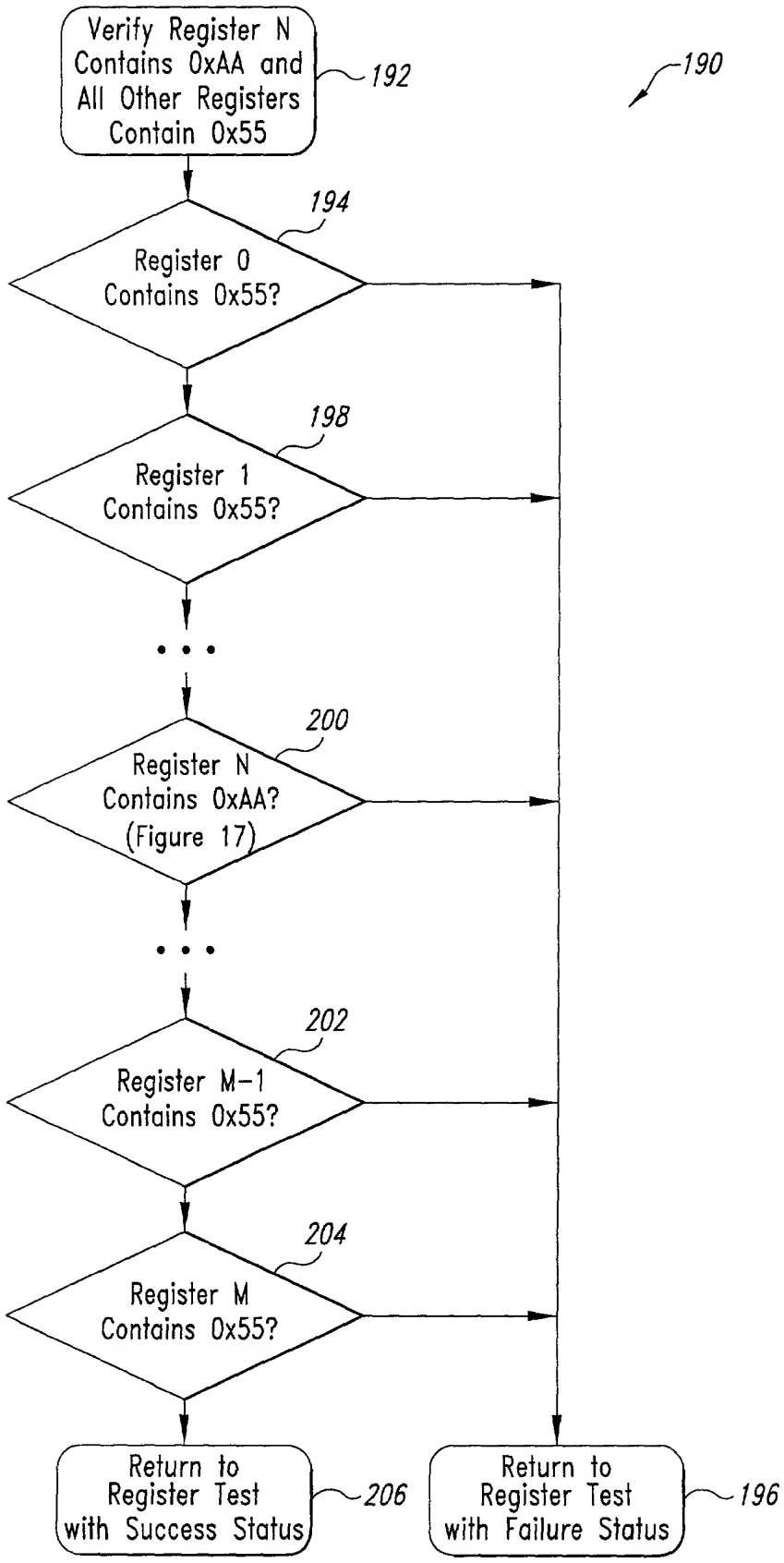
Verify Register N Contains 0xAA and All Other Registers Contain 0x55
192
190
194
Register 0 Contains 0x55?
198
Register 1 Contains 0x55?
200
Register N Contains 0xAA? (Figure 17)
202
Register M-1 Contains 0x55?
204
Register M Contains 0x55?
Return to Register Test with Success Status
206
Return to Register Test with Failure Status
196

*Fig. 12*

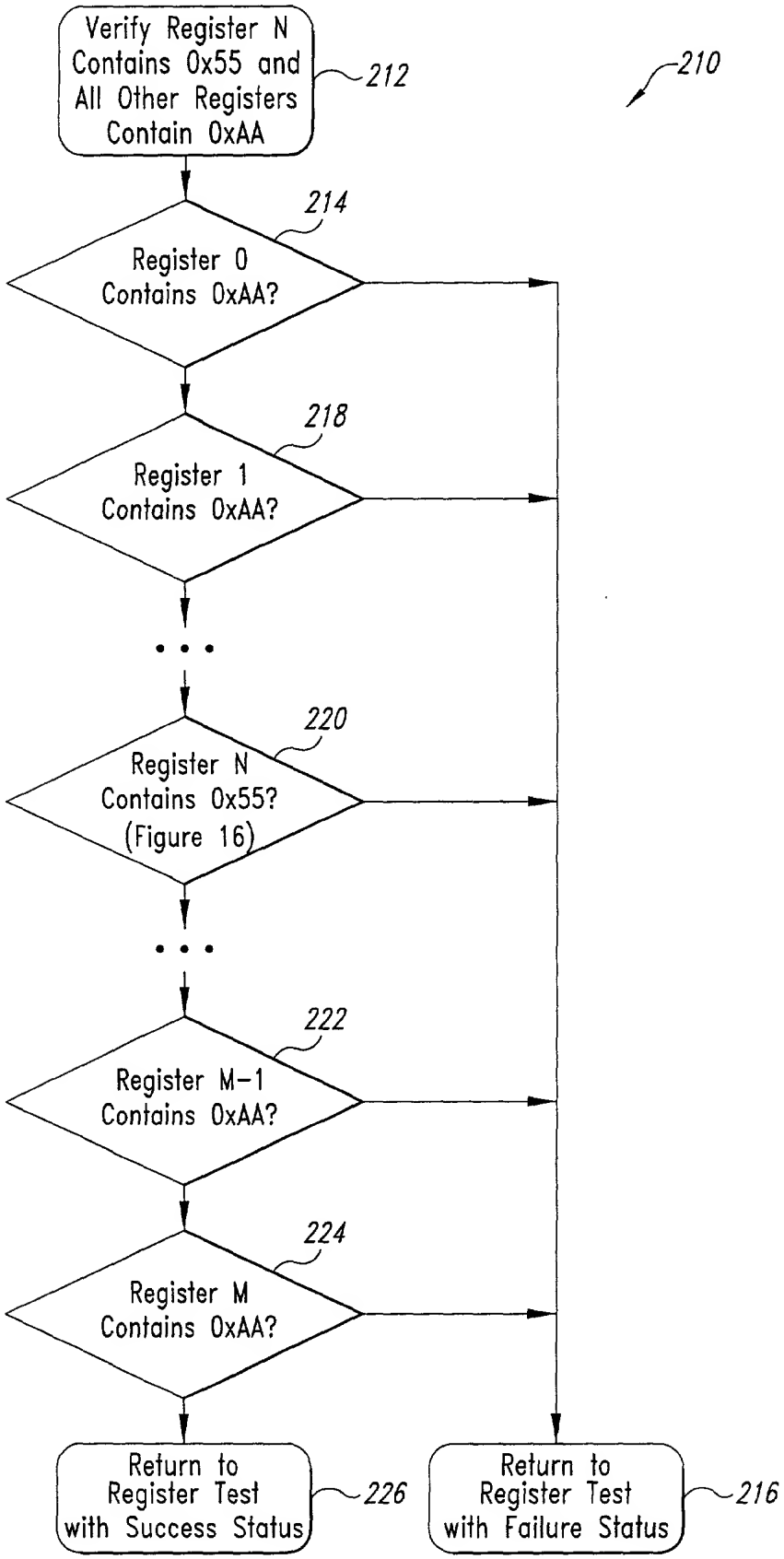
Verify Register N Contains 0x55 and All Other Registers Contain 0xAA
212
210
214
Register 0 Contains 0xAA?
218
Register 1 Contains 0xAA?
220
Register N Contains 0x55? (Figure 16)
222
Register M-1 Contains 0xAA?
224
Register M Contains 0xAA?
Return to Register Test with Success Status
226
Return to Register Test with Failure Status
216

*Fig. 13*

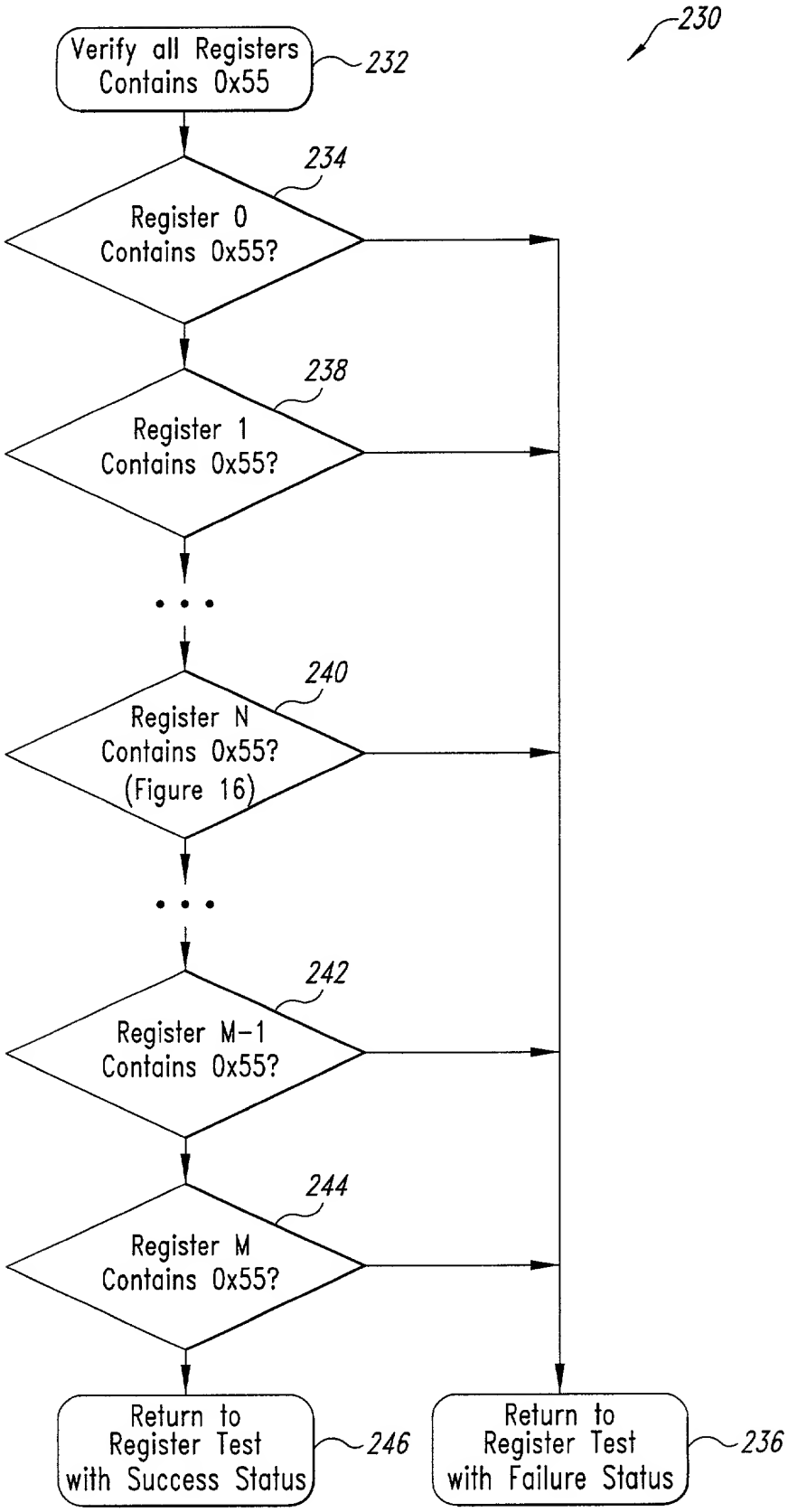
230
Verify all Registers Contains 0x55
232
234
Register 0 Contains 0x55?
238
Register 1 Contains 0x55?
240
Register N Contains 0x55? (Figure 16)
242
Register M-1 Contains 0x55?
244
Register M Contains 0x55?
Return to Register Test with Success Status
246
Return to Register Test with Failure Status
236

*Fig. 14*

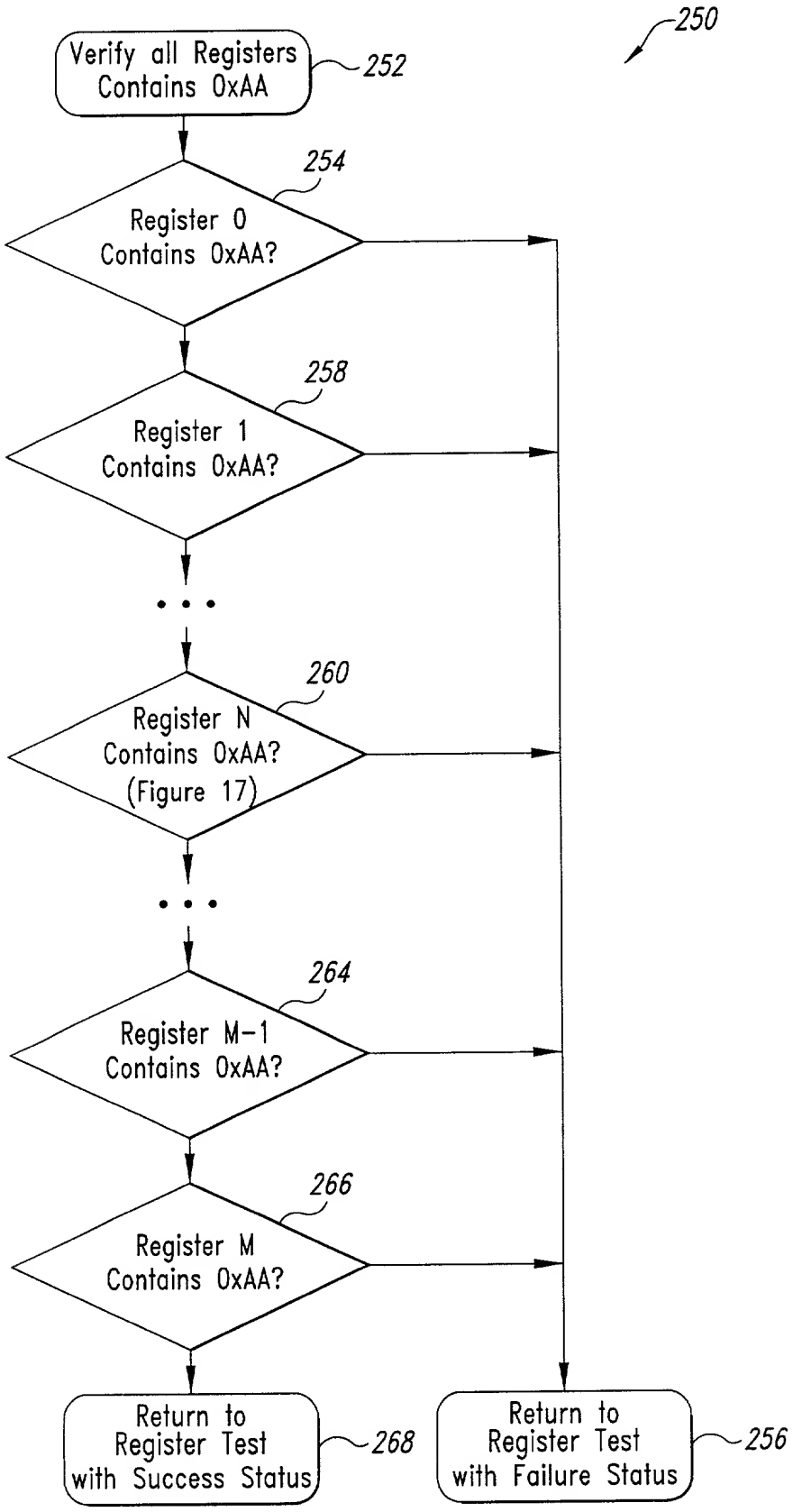
250
Verify all Registers Contains 0xAA
252
254
Register 0 Contains 0xAA?
258
Register 1 Contains 0xAA?
260
Register N Contains 0xAA? (Figure 17)
264
Register M-1 Contains 0xAA?
266
Register M Contains 0xAA?
Return to Register Test with Success Status
268
Return to Register Test with Failure Status
256

Fig. 15

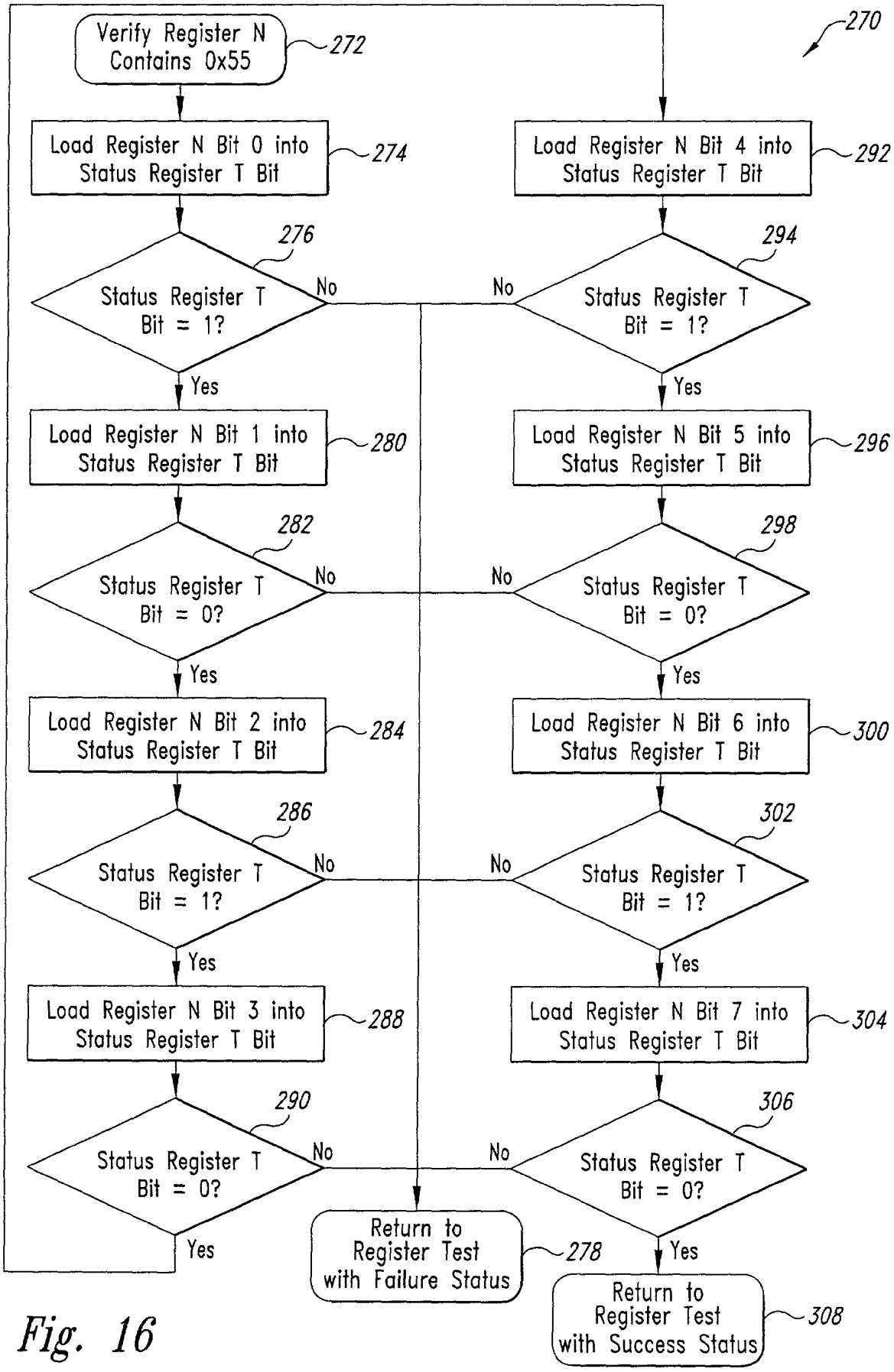
270
Verify Register N Contains 0x55
272
Load Register N Bit 0 into Status Register T Bit
274
Status Register T Bit = 1?
276
No
Yes
Load Register N Bit 1 into Status Register T Bit
280
Status Register T Bit = 0?
282
No
Yes
Load Register N Bit 2 into Status Register T Bit
284
Status Register T Bit = 1?
286
No
Yes
Load Register N Bit 3 into Status Register T Bit
288
Status Register T Bit = 0?
290
No
Yes
Load Register N Bit 4 into Status Register T Bit
292
Status Register T Bit = 1?
294
No
Yes
Load Register N Bit 5 into Status Register T Bit
296
Status Register T Bit = 0?
298
No
Yes
Load Register N Bit 6 into Status Register T Bit
300
Status Register T Bit = 1?
302
No
Yes
Load Register N Bit 7 into Status Register T Bit
304
Status Register T Bit = 0?
306
No
Yes
Return to Register Test with Failure Status
278
Return to Register Test with Success Status
308

*Fig. 16*

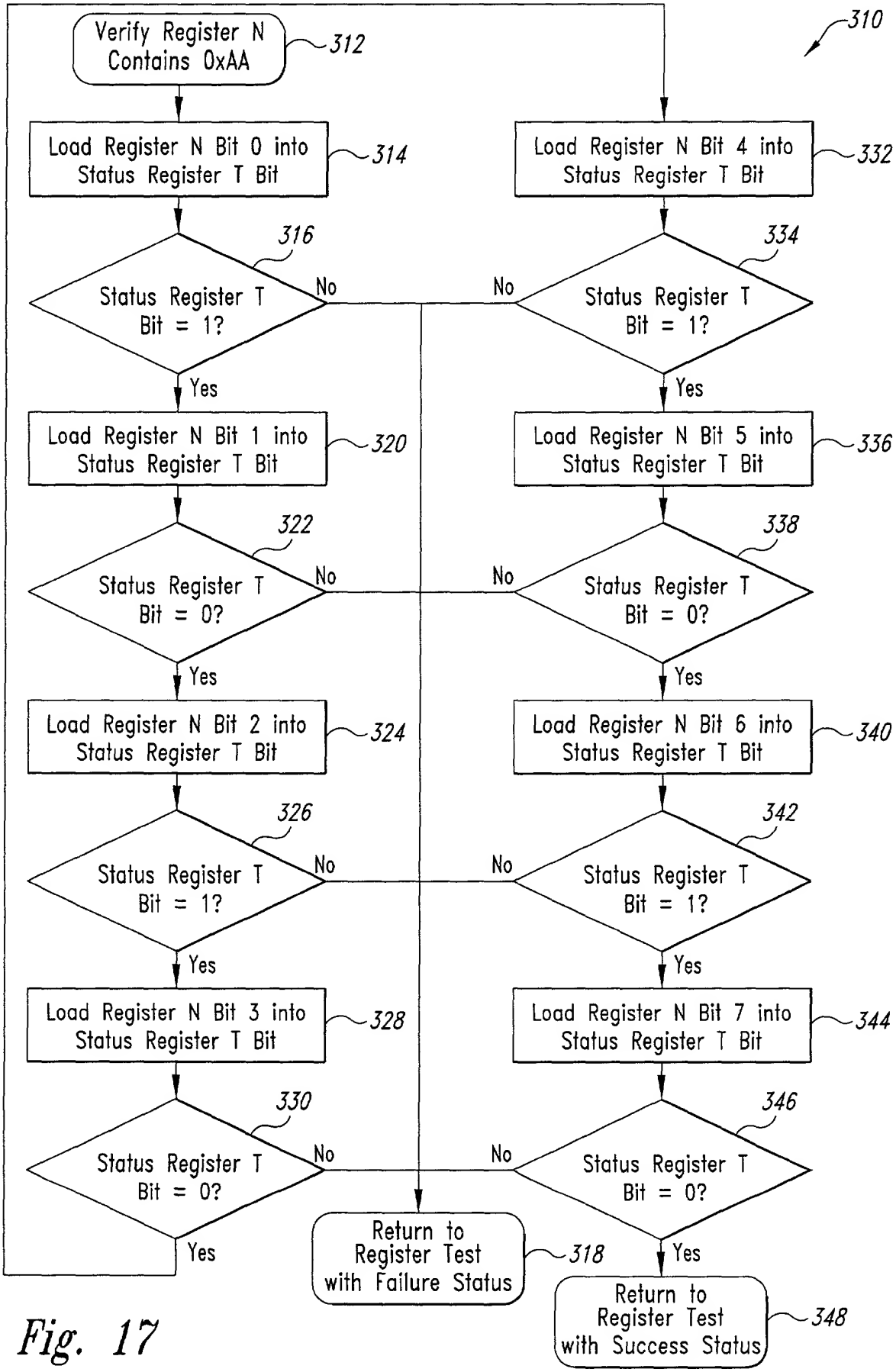
310
Verify Register N Contains 0xAA
312
Load Register N Bit 0 into Status Register T Bit
314
316
Status Register T Bit = 1?
No
Yes
Load Register N Bit 1 into Status Register T Bit
320
322
Status Register T Bit = 0?
No
Yes
Load Register N Bit 2 into Status Register T Bit
324
326
Status Register T Bit = 1?
No
Yes
Load Register N Bit 3 into Status Register T Bit
328
330
Status Register T Bit = 0?
No
Yes
Load Register N Bit 4 into Status Register T Bit
332
334
Status Register T Bit = 1?
No
Yes
Load Register N Bit 5 into Status Register T Bit
336
338
Status Register T Bit = 0?
No
Yes
Load Register N Bit 6 into Status Register T Bit
340
342
Status Register T Bit = 1?
No
Yes
Load Register N Bit 7 into Status Register T Bit
344
346
Status Register T Bit = 0?
No
Yes
Return to Register Test with Failure Status
318
Return to Register Test with Success Status
348

*Fig. 17*

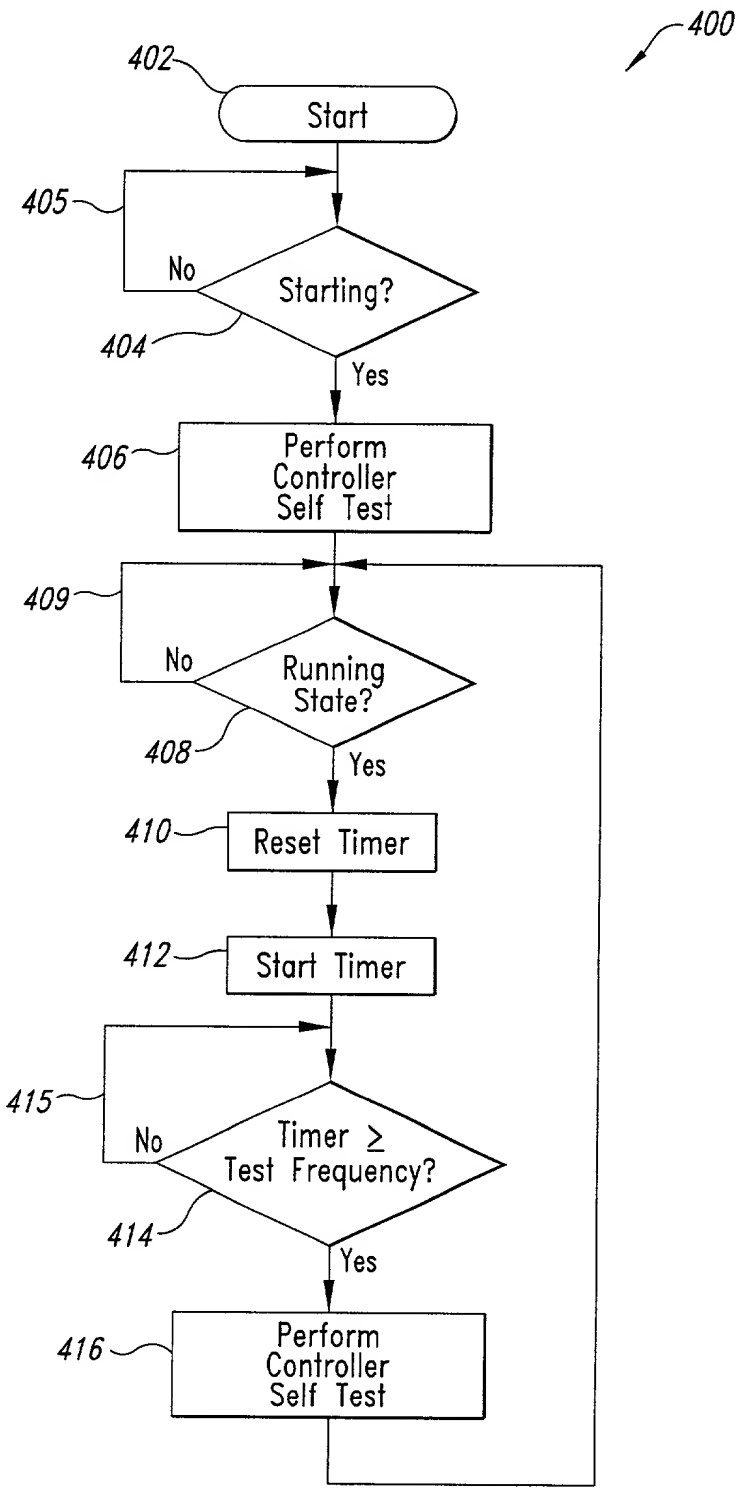
400
402
Start
405
No
Starting?
404
Yes
406
Perform Controller Self Test
409
No
Running State?
408
Yes
410
Reset Timer
412
Start Timer
415
No
Timer ≥ Test Frequency?
414
Yes
416
Perform Controller Self Test

*Fig. 18*